ANG_{LOCAL} can be aligned with the remote angle ANG_{REMOTE} to obtain the angle difference between the two ends of the line. This angle difference can then be used by the relay logic to perform control or protection functions, with fixed or programmable logic.

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended).

A protective relay ~~using~~, comprising:

an acquisition circuit for obtaining at least one of the following: (1) voltage values and (2) current values, from an electric power system;

a sampling circuit for sampling the voltage or current values at selected intervals of time, wherein the sampling is based on an absolute time reference; and

a communication system for transmitting messages containing synchronized phasor values from said protective relay to a host device, said synchronized phasor values being acquired independent of power system frequency.

Claim 2 (Original).

The relay of claim 1, wherein the absolute time reference is provided by a global positioning system.

Claim 3 (Original).

The relay of claim 1, wherein sampling frequency is independent of power system frequency.

Claim 4 (Original).

The relay of claim 1, wherein the acquisition circuits and the sampling circuit use both voltage and current values.

Claim 5 (Currently amended).

A protective relay using synchronized phasor measurements for protection of electric power systems, comprising:

an acquisition circuit for obtaining at least one of the following: (1) voltage values and (2) current values, from the power system;

a sampling circuit for sampling the voltage or current values at selected intervals of time, wherein the sampling is based on an absolute time reference; and

a calculation system using said sampled signals to produce synchronized voltage or current phasor values and then using said synchronized voltage or current phasor values to perform selected protection functions for the power system, said synchronized voltage and current phasor values being acquired independent of power system frequency.

Claim 6 (Original).

The relay of claim 5, wherein the absolute time reference is provided by a global positioning system.

Claim 7 (Original).

The relay of claim 5, wherein sampling frequency is independent of power system frequency.

Claim 8 (Original).

The relay of claim 5, wherein the acquisition circuits, the sampling circuit and the calculation system use both voltage and current values.

Claim 9 (Original).

The relay of claim 5, wherein the calculation system is responsive to voltage or current values from said protective relay and from another relay which is remote from said protective relay to perform selected protection functions for the power system involving the protective relay and said another relay.

Claim 10 (Original).

The relay of claim 5, including communication means for transmitting messages containing synchronized phasor values from said protective relay to a host computer, wherein the messages contain an absolute time reference indication or a sample number the data being transmitted and the synchronized phasor values for the voltages and currents in the power system for said sample with respect to absolute time.

Claim 11 (Original).

The relay of claim 5, wherein the relay includes a communication circuit responsive to a request from the host computer to report the synchronized phasor values of voltages and currents present on the power system at specified times, wherein the synchronized phasor values from a plurality of protective relays in the power system are used by the host computer to provide an indication of the operating condition of the power system at said specified times.

Claim 12 (Original).

The relay of claim 5, wherein the calculation system uses the absolute time reference information from a remote relay in the power system to align data, including both magnitude and angle, from the local and remote sources thereof, and further uses the aligned magnitude and angle information to perform the protection and/or control functions.

Claim 13 (Currently Amended).

A protective relay using synchronized phasor measurements for protection of electric power systems, comprising:

an acquisition circuit for obtaining at least one of the following: (1) voltage values and (2) current values, from the power system;

a sampling circuit for sampling the voltage or current values at selected intervals of time, wherein the sampling is based on an absolute time reference; and

a calculation system using said sampled signals to produce synchronized voltage or current phasor values and then using said synchronized voltage or current phasor values to perform selected protection functions for the power system, said synchronized voltage and current phasor values being acquired independent of power system frequency, wherein the relay includes a receiving circuit for receiving voltage or current values from another relay which is remote from said protective relay and wherein the calculation system is responsive to the voltage or current values from said protective relay and from said another relay to perform selected protection functions for the power system involving the protective relay and said another relay.

Claim 14 (Original).

The relay of claim 13, wherein the absolute time reference is provided by a global positioning system.

Claim 15 (Original).

The relay of claim 13, wherein sampling frequency is independent of power system frequency.

Claim 16 (Original).

The relay of claim 13, wherein the acquisition circuits and the sampling circuit use both voltage and current values.

Claim 17 (newly added).

The relay of claim 1, wherein the synchronized phasor values transmitted from the protective relay to the host device are positive sequence values.

Claim 18 (newly added).

The relay of claim 1, wherein the synchronized phasor values transmitted from the protective relay to the host device are Clarke components.

Claim 19 (newly added).

The relay of claim 5, wherein the synchronized phasor values produced by the calculation system are positive sequence values.

Claim 20 (newly added).

The relay of claim 5, wherein the synchronized phasor values produced by the calculation system are Clarke components.

Claim 21 (newly added).

The relay of claim 13, wherein the synchronized phasor values produced by the calculation system are positive sequence values.

Claim 22 (newly added).

The relay of claim 13, wherein the synchronized phasor values produced by the calculation system are Clarke components.